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(54) **Tampon, especially for feminine hygiene, and a process and apparatus for producing this.**

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Description

The invention relates to a tampon, especially for feminine hygiene, according to the pre-characterizing clause of Patent Claim 1 and to a process and an apparatus for producing the tampon, according to the pre-characterizing clause of Patent Claims 6 and 13.

A tampon of the abovementioned generic type is known from German Auslegeschrift 1,491,161. This tampon has proved appropriate in practice because of its high absorption capacity, fluid retention capacity, rate of absorption, stability and buckling strength. For this, the tampon has longitudinal grooves which are caused by pointed press jaws and on each of the two sides of which occur longitudinal ribs which are pressed to the approximately cylindrical final form of the tampon during a subsequent pressing operation by means of press jaws with partially cylindrical press faces.

The object on which the invention is based is to improve the tampon of the abovementioned generic type in such a way that the absorption capacity and rate of absorption of the tampon appertaining to the two are essentially maintained, but the specific absorption capacity of the tampon is increased.

The invention achieves this object by means of the features contained in the characterizing clause of Patent Claim 1. It was shown surprisingly that a tampon having these features makes it possible to obtain an appreciable increase in the specific absorption capacity (ml/g), whilst preserving the hitherto obtained absorption capacity and rate of absorption, with a surprisingly smaller amount of fibre material being used. This effect is attributable to a coarser capillary structure of the fibre material in the outer layer of the tampon.

Thus, it was found that a tampon according to the invention consisting of 100% rayon fibres with a weight of 2.4 g without the recovery tape can have a specific absorption capacity of 4.8 ml/g with a rate of absorption of 1.9 ml/s. The absorption capacity of such a tampon can be obtained at a static counterpressure of 20 mbars 11.3 ml. In a test with a pulsating counterpressure of 20 to 110 mbars approximating extremely closely to the practical conditions of use, the absorption capacity of the tampon according to the invention can amount to 8.0 ml and the specific absorption capacity of 3.4 ml/g.

The diameter of the tampon is set at between 13 and 15 mm according to the customary physiological conditions, and the central fibre core can preferably have a diameter of 4 to 8 mm. A high buckling strength of the tampon can thus be achieved, whilst at the same time the soft surface of the tampon guarantees a pleasant handling of the tampon.

The invention relates, furthermore, to a process for producing this tampon having the features contained in the pre-characterizing clause of Patent Claim 6. A process of this type is known from German Auslegeschrift 1,491,161 already mentioned.

According to the invention, this process for producing the tampon according to the invention is improved by means of the features contained in the characterizing clause of Patent Claim 6.

The invention relates, moreover, to an apparatus for producing the tampon and for carrying out the abovementioned process, having the features contained in the pre-characterizing clause of Patent Claim 13. An apparatus of this generic type is likewise known from German Auslegeschrift 1,491,161. According to the invention, this known apparatus is improved by means of the features contained in the characterizing clause of Patent Claim 13, with the effect of the best possible production of the tampon according to the invention. The fact that only press cutters are provided on the end faces of the segment-shaped pressed jaws and of the sliding plates guarantees a merely partial pressing of the winding blank to produce a preform which is subsequently subjected only to a weak concentric shaping in the following forming die, thereby providing a smooth, soft and aesthetically pleasing surface of the tampon, but which, despite the use of a smaller amount of fibre material, allows an appreciably increased specific absorption capacity of the tampon, without the tampon suffering from a loss of absolute absorption capacity in comparison with the known tampon mentioned.

The apparatus according to the invention is advantageously developed by means of the features mentioned in the subclaims.

The invention is explained in more detail below by means of the diagrammatic drawing of an exemplary embodiment of the tampon and of an apparatus for producing this. In the drawing:

- Fig. 1 shows the tampon according to the invention in a middle longitudinal section along the sectional line I - I in Fig. 2,
- Fig. 2 shows a cross-section II - II according to Fig. 1,
- Fig. 3 shows a cross-section through the preform along the line III - III in Fig. 8,
- Fig. 4 shows a cross-section of the tampon in the enlarged representation,
- Fig. 5 shows a diagrammatic view of a preforming press in the opened state with a winding blank arranged in it,
- Fig. 6 and 7 show a separate closing movement of the pressing dies, wherein Fig. 6 illustrates a first pressing face of the preforming press with closed press segments, whilst a second, final

press face of the preforming press is illustrated in Fig. 7 showing the sliding plates in the closed position, wherein all press dies enclose the preform arranged in it, and

Fig. 8 and 9 show an alternative sequence of movements of the press dies, wherein the press segments and the sliding plates are simultaneously moved into the closed position; Fig. 8 shows an interphase of the pressing procedure and Fig. 9 the press dies completely closed with the preform arranged in it, and

Fig. 10 shows a partially sectional side view of the apparatus for producing the tampon with the preforming press and with the following forming die.

Figures 1 and 2 show a tampon 10 for feminine hygiene formed from an approximately cylindrical blank 11 which is shaped by winding up a portion of length of nonwoven material, needled if appropriate. The nonwoven can consist of natural or synthetic fibres or of a mixture of such fibres. Natural fibres coming under consideration are preferably those of cotton. Rayon or other synthetic fibres are also highly suitable. The circumferential surface of this winding blank is pressed in a way known per se radially relative to the longitudinal mid-axis of the winding blank over an even number of at least six, preferably eight portions mutually adjacent in the circumferential direction of the winding blank 11.

According to the invention, these circumferential portions of the winding blank 11 are exclusively narrow strip-shaped portions 12, 13 of the circumferential surface 14 of the winding blank 11 which are arranged at equal angular distances α from one another and which are pressed to produce a preform 15 in Figs. 3, 7 and 8. As seen in cross-section, the preform 15 consists of a central approximately circular fibre core 16 of high compression and stability or buckling strength and of longitudinal ribs 17 extending radially outwards from the fibre core 16 and of a fibre structure softer than that of the fibre core and of correspondingly coarser capillary structure (Fig. 3). The longitudinal ribs 17 are separated from one another by outwardly open longitudinal grooves 18. Only the soft longitudinal ribs 17 of the preform 15 have been exposed to a low uniform pressure radial relative to the longitudinal mid axis 19 of the preform 15, in such a way that the radially outer ends 20 of the longitudinal ribs 17 form a soft essentially smoothly cylindrical surface of smaller diameter corresponding to the final form of the tampon 10.

It was found that the tampon according to the invention has a stability 100% higher than that of the known tampon. It was shown, furthermore, that approximately 10% of the fibres used for the tampon can be saved, without any appreciable impairment, if any, of the absorption capacity. In contrast, the rate of absorption is in the upper range of known tampons, whilst the specific absorption capacity is increased appreciably in relation to known tampons.

The following table illustrates a comparative test of the tampon according to the invention consisting of a needled nonwoven composed of 100% of rayon fibres from Hoechst AG, and a tampon obtainable in the trade under the commercial designation "Standard o.b.":

Table

		Tampon according to the invention	"Standard o.b." Tampon
1.	Weight(g) without the recovery tape	2.4	2.7
2.	Absorption capacity (ml) 20 mbars static counterpressure in test unit	11.3	11.5 - 12.5
3.	Specific absorption capacity (ml/g)	4.8	4.2 - 4.5
4.	Rate of absorption (ml/s)	1.9	1.5 - 2.0
5.	Absorption capacity (ml) in ABTS test unit with pulsating counterpressure of 20 - 110 mbars	8.0	8.6
6.	Specific absorption capacity (ml/g) in ABTS test unit	3.4	3.1

The absorption capacity values indicated in line 2 of the Table were determined in a test unit, in which the tampon is surrounded by an elastic diaphragm which exerts a static counterpressure on the tampon, whilst one end of the tampon is sprinkled with water. This resulted in the specific fluid absorption capacity in ml/g of fibre material of the tampon evident from line 3 of the Table.

The rate of absorption emerging from line 4 was determined in this test arrangement. The values show that, at a weight of the tampon according to the invention reduced by approximately 10%, the absorption capacity of the tampon is not essentially reduced in relation to the known tampon, the rate of absorption is of the upper limit of that of the known tampon, and the specific absorption capacity is appreciably higher than in the known tampon. Since the specific absorption capacity is evidence of a better utilization of the absorbency of the fibre material per unit weight, it is clear that the tampon according to the invention can be produced more cheaply as a result of the lower weight of material.

Lines 5 and 6 of the Table give values for the absorption capacity and the specific absorption capacity determined in a test arrangement allowing test conditions such as actually occur when the tampon is being worn.

The system designated as ABTS, corresponding to Absorptive Behaviour Test System, is computer-assisted and serves for the acquisition and processing of measurement data regarding the absorption behaviour of absorbent products and for controlling the test cycle.

The test of the tampon is conducted under the following conditions which, as mentioned, occur approximately in vivo:

- chemical/physical compositions of the test fluid
- spacial arrangement of the product, for example inclination
- positioning of the product in the measuring cell

- strength of the flow
- interruption (start/stop) of the flow
- pressure variant.

The test cycle is software-controlled automatically and allows a dialogue between the operator and system. The measurement data are required automatically, their evaluation taking place according to statistical factors. The test cycle for each random sample can be tracked on a video screen by means of a measurement curve and, if appropriate, printed out automatically. Furthermore, the fluid distribution in the product is represented qualitatively and quantitatively. Moreover, the leakage behaviour of the tampon can be checked. By leakage is meant the phenomenon in which menstruation fluid can escape between the body wall and tampon. The feed of test fluid to the tampon is carried out exclusively without pressure, since the fluid level is at the height of the test tampon. The fluid is therefore sucked up into the tampon solely as a result of the wetting of the tampon and the wick effect caused by the capillary forces of the latter, and by means of the pulsating counterpressure on the tampon which is felt in practice.

The values determined with this ABTS test device illustrate, in lines 5 and 6 of the Table, that, at the pulsating counterpressure indicated, the absorption capacity of the tampon is only slightly lower than in the reference tampon, but here too the specific absorption capacity of the tampon according to the invention per gram of fibre material is approximately 10% higher than in the reference tampon.

The diameter of the tampon according to the invention is between 13 and 15 mm in its final form. The central fibre core 16 has a diameter of approximately 4 to 8 mm.

Figure 4 shows an enlarged cross-sectional representation of the fibre structure of the tampon according to the invention. It is possible to see clearly the central fibre core 16, from which extend outwards eight longitudinal ribs 17 touching one another at their outer ends 20. The tampon cross-section shows, moreover, that the loose fibre structure with its coarser capillary structure of the longitudinal ribs 17 is preserved, despite the concentric pressure to which these longitudinal ribs are exposed during the production of the final form of the tampon. In contrast, the fibre core 16 having a high fibre compression guarantees a stability or buckling strength which is twice as high as that of the reference tampon and which is of great importance when the tampon is used as a digital tampon.

The figures illustrate an apparatus according to the invention for producing the tampon. According to Figures 5 to 7, this apparatus consists of two groups of altogether eight press dies arranged in a plane perpendicular to the press axis 21, the first group of press dies forming press segments 22. In the closing position shown in Figure 6, the side flanks 23 of these four press segments 22 form respectively for each of the four press dies of the second group guide surfaces which are designed as sliding plates 24. At the same time, the press segments 22 and the sliding plates 24 serve, as a preforming press, for pressing the winding blank 11 to produce the preform 15 in Figure 7. Exclusively press cutters 27 projecting from the end faces 25 and 26 of the press segments 22 and of the sliding plates 24 serve for pressing the blank. It is evident from Figures 5 to 7 that the press cutters project from the end faces 25 and 26 of the press segments 22 and sliding plates 24 at equal angular distances and over the same length. The shape and dimensions of all the press cutters are identical. The press cutters are therefore also equipped at their front end with the same pressing faces 28 which, in the exemplary embodiment illustrated, each extend parallel to the press axis axis and are curved outwards in the manner of a semi-cylinder.

In the exemplary embodiment, the length and width of the press cutters 27 radial relative to the press axis 21 amount to 10 mm and 2 mm respectively. In the closed state of the preforming press, the pressing faces 26 of the press cutters 27 assume a clear distance of 4 mm from the press axis 21 (Fig. 7). This distance can also be smaller, for example 2 mm.

In contrast with Figs. 6 and 7 a synchronous closing movement of the press segments 22 and sliding plates 24 related radially to the axis of the press and the winding blank, respectively, Fig. 8 shows an interphase of this closing movement of all press dies, whilst the final closing position of these press dies is shown in Fig. 9, which position corresponds to the final dimension of the preform 15. The simultaneous pressing movement of the press segments 22 and the sliding plates 24 has the advantage, that the geometrical uniformity of the circumferential strip shaped portions 12 and 13 of the preform 15 will be enhanced. If the tampon is wetted by a fluid the tampon will expand to a more circular shape than in case of the sequential movement of the press dies as shown in Figs. 6 and 7.

If appropriate, however, the press faces can also have a mutually differing shape. If appropriate, the sliding plates can also be designed differently, for example made angular, arrow-shaped or drop-shaped. It is essential that they load and press only a narrow circumferential portion of the blank corresponding approximately to a generatrix. Furthermore, the cycle of movement of the two groups of press dies can, where appropriate, also take place simultaneously or interruptedly in the preforming and post forming and alternately between these two movement actions. Thus, it can be important, according to the process of German Auslegeschrift

1,491,161, first to close all the press dies simultaneously only up to the circumference of the blank 11, in order to centre the blank as exact as possible in relation to the press axis 21, before commencing the actual pressing operation, so as to ensure that the central fibre core 16 comes to rest exactly in the middle of the tampon 10. This is desirable to obtain the highest possible buckling strength or stability of the tampon, above all when the latter is to be used as a digital tampon.

According to Fig. 10, the preforming press described is followed by a stationary conical forming die 29. This forming die 29 is arranged coaxially relative to the press axis 21. The entry orifice 30 of the forming die has a diameter which corresponds approximately to the orifice of the preforming press in the closed state of its press dies which is shown in Fig. 7. The inner face 31 is narrowed towards the cylindrical exit orifice 32 according to an obtuse-angled circular cone, the cross-section of the exit orifice 32 corresponding to the final cross-section of the finished tampon 10. Arranged on the input side of the preforming press is a ram 33 which serves for introducing the winding blank 11 into the preforming press and for ejecting the preform 15 through the forming die 29. For this purpose, the ram 33 is arranged movably to and fro coaxially in relation to the press axis 21. Rams of this type are known in the art, and therefore there is no need to represent the driving elements for the ram.

The production of the tampon according to the invention by means of the above-described apparatus is carried out according to the following process: the essentially cylindrical winding blank 11 is pressed solely on the narrow strip-shaped portions 12 and 13, arranged at equal angular distances from one another, or the circumferential surface of the winding blank, to produce the preform 15 which, as seen in cross-section, consists of the central approximately circular fibre core 16 of high compression and buckling strength or stability and of longitudinal ribs 17 of softer fibre structure extending radially outwards from the fibre core 16. At the same time, the longitudinal ribs 17 are separated from one another by the outwardly open longitudinal grooves 18. Thereafter, only the soft longitudinal ribs 17 of the preform 15 are exposed to a low uniform pressure radial relative to the longitudinal mid-axis of the preform, until the outer ends of the longitudinal ribs have produced a soft essentially smoothly cylindrical surface of smaller diameter corresponding to the final form of the tampon 10. As mentioned, preferably before the actual pressing, the winding blank 11 is centred relative to the press axis 21 of the preforming press as a result of the simultaneous concentric closing of the press segments 22 and sliding plate 24 approximately as far as the circumference of the winding blank.

After the pressing of the preform, the latter is ejected through the forming die 29 by means of the ram 33 and thereby brought to the final dimension of the tampon which is determined by the exit orifice 32 of the forming die 29.

Claims

1. Tampon, especially for feminine hygiene, formed from an approximately cylindrical blank which is shaped by winding up a portion of length of tape-shaped nonwoven material, and the circumferential surface of which is pressed radially relative to the longitudinal mid-axis of the blank over an even number of at least 6 portions mutually adjacent in the circumferential direction of the winding blank, characterized in that only narrow strip-shaped portions of the circumferential surface of the winding blank, which are arranged at equal angular distances from one another, are pressed to produce a preform which, as seen in cross-section, consists of a central approximately circular fibre core (16) of high compression and buckling strength and of longitudinal ribs (17) of softer fibre structure and with a coarser capillary structure which extend radially outwards from the fibre core and which are separated from one another by outwardly open longitudinal grooves (18), and in that, accordingly, only the soft longitudinal ribs of the preform (15) have been exposed to a low uniform pressure, radial relative to the longitudinal mid-axis of the preform, in such a way that the outer ends of the longitudinal ribs form a soft essentially smoothly cylindrical surface of smaller diameter, with the coarser capillary structure corresponding to the final form of the tampon being maintained (10).

2. Tampon according to Claim 1, the blank of which is produced from a needled nonwoven tape consisting of 100 % rayon fibre, characterized in that the tampon, with a weight of 2.4 g without the recovery tape, has a specific absorption capacity of 4.8 ml/g at an absorption rate of 1.9 ml/s.

3. Tampon according to Claim 2, characterized in that the absorption capacity of the tampon amounts to 11.3 ml at a static counterpressure of 20 mbars.

4. Tampon according to Claims 1 and 3, characterized in that, at a pulsating counterpressure of 20 to 110

mbars, the absorption capacity of the tampon amounts to 8.0 ml and the specific absorption capacity to 3.4 ml/g.

5. Tampon according to one of Claims 1 to 4, characterized in that the diameter of the tampon, in its final form, amounts to between 13 and 15 mm, the central fibre core having a diameter of 4 to 8 mm.

6. Process for producing the tampon according to Claims 1 to 5, in which an essentially cylindrical blank is shaped by winding up a portion of length of tape-shaped nonwoven material, the circumferential surface of which is pressed radially relative to the longitudinal mid-axis of the blank over an even number of at least six portions mutually adjacent in the circumferential direction of the winding blank, characterized in that only narrow strip-shaped portions of the circumferential surface of the winding blank, which are arranged at equal angular distances from one another, are pressed to produce a preform which, as seen in cross-section, consists of a central approximately circular fibre core of high compression and buckling strength and of longitudinal ribs of a softer fibre structure with a coarser capillary structure which extend radially outwards from the fibre core and which are separated from one another by outwardly open longitudinal grooves, and in that, accordingly, only the soft longitudinal ribs of the preform are exposed to a low uniform pressure, radial relative to the longitudinal mid-axis of the preform, until the outer ends of the longitudinal ribs have formed a soft essentially smoothly cylindrical surface of smaller diameter, with the coarser capillary structure corresponding to the final form of the tampon being maintained.

7. Process according to Claim 6, characterized in that the winding blank is centred before the pressing.

8. Process according to Claim 6, characterized in that the preform is moved for shaping purposes.

9. Apparatus for producing the tampon according to one of Claims 1 to 8 and for carrying out the process according to one of Claims 6 to 8, consisting of two groups of altogether at least six press dies arranged in a plane perpendicular to the press axis, the first group of press dies forming press segments, of which the side flanks, in the closing position of the press segments, form respectively for each of the press dies of the second group guide surfaces which are designed as sliding plates, in the closed state the end faces of the press dies forming an essentially cylindrical pressing face, characterized in that the press segments (22) and the sliding plates (24) form a preforming press for the pressing of a preform (15), press cutters (27) projecting from the end faces (25, 26) of the press segments (22) and of the sliding plates (24), and in that the preforming press is followed by a stationary conical forming die (29) which is arranged coaxially relative to the press axis, and the entry orifice (30) of which is calculated to match the diameter of the orifice of the preforming press, when its press dies (22, 24) are in the closed state, and the exit orifice (32) of which is calculated to match the final cross-section of the finished tampon (10).

10. Apparatus according to Claim 9, characterized in that the press cutters (27) project from the end faces (25, 26) of the press segments (22) and sliding plates (24) at equal angular distances (α) and over the same length.

11. Apparatus according to Claims 9 or 10, characterized in that all the press cutters (27) have the same pressing faces (28).

12. Apparatus according to Claim 11, characterized in that the pressing face (28) of the press cutters (27) which is parallel to the press axis (21) is curved outwards.

13. Apparatus according to Claims 9 or 10, characterized in that the press cutters (27) have pressing faces (28) of differing form.

14. Apparatus according to one of Claims 9 to 13, characterized in that the length and width of the press cutters (27), radial relative to the press axis (21), amounts to 10 and 2 mm respectively.

15. Apparatus according to one of Claims 9 to 14, characterized in that, when the press is in the closed state, the pressing faces (28) of the press cutters (26) assume a clear distance of 2 to 4 mm from the press axis (21).

16. Apparatus according to Claim 9, characterized in that the conical forming die (29) has an entry orifice (30) with a diameter of 20 mm and an exit orifice (32) with a diameter of 13 mm.

17. Apparatus according to one of Claims 9 to 16, characterized in that all the press dies (22, 24) are first closable concentrically relative to the press axis (21) to approximately the diameter of the winding blank (11), subsequently the press segments (22) of the first group are simultaneously movable concentrically into the closing position, and thereafter the sliding plates (24) of the second group are movable to the final dimension of the preform (15).

18. Apparatus according to one of Claims 9 to 16, characterized in that the press segments (22) and the sliding plates (24) are simultaneously movable concentrically relative to the press axis (21) into the closing position which corresponds to the final dimension of the preform (15).

19. Apparatus according to one of Claims 9 to 18, characterized in that, arranged on the input side of the preforming press, there is a ram (33) which is movable axially to and fro for ejecting the preform (15) from the preforming press and for pushing the preform through the conical forming die (29).

Patentansprüche

1. Tampon, insbesondere für die Frauenhygiene, der aus einem durch Aufwickeln eines Längenabschnitts aus bandförmigem Faservlies geformten, etwa zylindrischen Rohling gebildet ist, dessen Umfangsfläche auf einer geraden Anzahl von mindestens sechs in Umfangsrichtung des Wickelrohlings benachbarten Abschnitten radial zur Mittellängsachse des Rohlings gepreßt ist, dadurch gekennzeichnet, daß ausschließlich schmale, streifenförmige, in gleichen Winkelabständen voneinander angeordnete Abschnitte der Umfangsfläche des Wickelrohlings zu einem Vorformling gepreßt sind, der, im Querschnitt gesehen, aus einem zentralen, etwa kreisförmigen Faserkern (16) hoher Verdichtung und Knickfestigkeit und sich von dem Faserkern radial nach außen erstreckenden Längsrippen (17) von weicherer Faserstruktur mit gröberer Kapillarstruktur besteht, die durch nach außen offene Längsnuten (18) voneinander getrennt sind, und daß danach ausschließlich die weichen Längsrippen des Vorformlings (15) einen schwachen, gleichmässigen, zur Mittellängsachse des Vorformlings radialen Druck ausgesetzt wurden, derart, daß die äußeren Enden der Längsrippen eine weiche, im wesentlichen glattzylindrische Oberfläche kleineren Durchmessers unter Beibehaltung der gröberen Kappilarstruktur entsprechend der Endform des Tampons bilden (10).

2. Tampon nach Anspruch 1, dessen Rohling aus einem genadelten Vliesband aus 100% Rayonfaser gebildet ist, dadurch gekennzeichnet, daß der Tampon mit einem Gewicht von 2,4 g ohne Rückholband eine spezifische Absorptionsfähigkeit von 4,8 ml/g bei einer Absorptionsgeschwindigkeit von 1,9 ml/s aufweist.

3. Tampon nach Anspruch 2, dadurch gekennzeichnet, daß die Absorptionsfähigkeit des Tampons bei einem statischen Gegendruck von 20 mbar 11,3 ml beträgt.

4. Tampon nach den Ansprüchen 1 bis 3, dadurch gekennzeichnet, daß die Absorptionsfähigkeit des Tampons bei einem pulsierenden Gegendruck von 20 bis 110 mbar 8,0 ml und die spezifische Absorptionsfähigkeit 3,4 ml/g betragen.

5. Tampon nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der Durchmesser des Tampons in seiner Endform zwischen 13 und 15 mm beträgt, wobei der zentrale Faserkern einen Durchmesser von 4 bis 8 mm aufweist.

6. Verfahren zum Herstellen des Tampons nach den Ansprüchen 1 bis 5, bei dem ein im wesentlichen zylindrischer Rohling durch Aufwickeln eines Längenabschnitts aus bandförmigem Faservlies geformt wird, dessen Umfangsfläche auf einer geraden Anzahl von mindestens sechs in Umfangsrichtung des Wickelrohlings benachbarten Abschnitten radial zur Mittellängsachse des Rohlings gepreßt wird, dadurch gekennzeichnet, daß ausschließlich schmale, streifenförmige, in gleichen Winkelabständen voneinander angeordnete Abschnitte der Umfangsfläche des Wickelrohlings zu einem Vorformling gepreßt werden, der, im Querschnitt gesehen, aus einem zentralen, etwa kreisförmigen Faserkern hoher Verdichtung und Knickfestigkeit und sich von dem Faserkern radial nach außen erstreckenden Längsrippen von weicherer Faserstruktur mit gröberer Kapillarstruktur besteht, die durch nach außen offene Längsnuten voneinander getrennt sind, und daß danach ausschließlich die weichen Längsrippen des Vorformlings einem schwachen, gleichmässigen, zur Mittellängsachse des Vorformlings radialen Druck so lange ausgesetzt werden, bis die äußeren Enden der Längsrippen eine weiche, im wesentlichen glattzylindrische Oberfläche

kleineren Durchmessers unter Beibehaltung der gröberen Kapillarstruktur entsprechend der Endform des Tampons gebildet haben.

7. Verfahren nach Anspruch 6, dadurch gekennzeichnet, daß der Wickelrohling vor dem Pressen zentriert wird.

8. Verfahren nach Anspruch 6, dadurch gekennzeichnet, daß der Vorformling zur Formgebung bewegt wird.

9. Vorrichtung zur Herstellung des Tampons nach einem der Ansprüche 1 bis 5 sowie zur Durchführung des Verfahrens nach einem der Ansprüche 6 bis 8, bestehend aus zwei Gruppen von insgesamt mindestens sechs in einer zur Pressenachse senkrechten Ebene angeordneten Preßwerkzeugen, wobei die erste Gruppe der Preßwerkzeuge Preßsegmente bildet, deren Seitenflanken in der Schließstellung der Preßsegmente für je eines der Preßwerkzeuge der zweiten Gruppe Führungsflächen bilden, die als Schiebeplatten ausgebildet sind, wobei die Stirnflächen der Preßwerkzeuge beider Gruppen im geschlossenen Zustand eine im wesentlichen zylindrische Preßfläche bilden, dadurch gekennzeichnet, daß die Preßsegmente (22) und die Schiebeplatten (24) eine Vorformpresse zum Pressen eines Vorformlings (15) bilden, wobei von den Stirnflächen (25, 26) der Preßsegmente (22) und der Schiebeplatten (24) Preßschneiden (27) vorstehen, und daß der Vorformpresse ein feststehendes, konisches Formwerkzeug (29) nachgeschaltet ist, daß koaxial zur Pressenachse angeordnet ist und dessen Eintrittsöffnung (30) dem Durchmesser der Öffnung der Vorformpresse im geschlossenen Zustand ihrer Preßwerkzeuge (22, 24) und deren Austrittsöffnung (32) dem Endquerschnitt des fertigen Tampons (10) entsprechend bemessen ist.

10. Vorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß die Preßschneiden (27) von den Stirnflächen (25, 26) der Preßsegmente (22) und Schiebeplatten (24) in gleichen Winkelabständen ( ) auf gleicher Länge vorstehen.

11. Vorrichtung nach den Ansprüchen 9 oder 10, dadurch gekennzeichnet, daß alle Preßschneiden (27) die gleichen Preßflächen (28) aufweisen.

12. Vorrichtung nach Anspruch 11, dadurch gekennzeichnet, daß die zur Pressenachse (21) parallele Preßfläche (28) der Preßschneiden (27) nach außen gewölbt ist.

13. Vorrichtung nach den Ansprüchen 9 oder 10, dadurch gekennzeichnet, daß die Preßschneiden (27) Preßflächen (28) unterschiedlicher Form aufweisen.

14. Vorrichtung nach einem der Ansprüche 9 bis 13, dadurch gekennzeichnet, daß die zur Pressenachse (21) radiale Länge bzw. Breite der Preßschneiden (27) 10 bzw. 2 mm beträgt.

15. Vorrichtung nach einem der Ansprüche 9 bis 14, dadurch gekennzeichnet, daß im geschlossenen Zustand der Presse die Preßflächen (28) der Preßschneiden (26) einen lichten Abstand von 2 bis 4 mm von der Pressenachse (21) einnehmen.

16. Vorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß das konische Formwerkzeug (29) eine Eintrittsöffnung (30) mit einem Durchmesser von 20 mm und eine Austrittsöffnung (32) von 13 mm aufweist.

17. Vorrichtung nach einem der Ansprüche 9 bis 16, dadurch gekennzeichnet, daß sämtliche Preßwerkzeuge (22, 24) zunächst bis auf etwa den Durchmesser des Wickelrohlings (11) konzentrisch zur Pressenachse (21) schließbar sind und anschließend die Preßsegmente (22) der ersten Gruppe gleichzeitig konzentrisch in die Schließstellung bewegbar sind und daraufhin die Schiebeplatten (24) der zweiten Gruppe bis auf das Endmaß des Vorformlings (15) bewegbar sind.

18. Vorrichtung nach einem der Ansprüche 9 bis 16, dadurch gekennzeichnet, daß die Preßwerkzeuge (22) und die Schiebeplatten (24) gleichzeitig konzentrisch relativ zu der Pressenachse (21) in die Schließstellung, die dem endgültigen Durchmesser des Vorformlings (15) entspricht, bewegbar sind.

19. Vorrichtung nach einem der Ansprüche 9 bis 18, dadurch gekennzeichnet, daß an der Eingangsseite der Vorformpresse ein Stössel (33) angeordnet ist, der zum Ausstoßen des Vorformlings (15) aus der Vorformpresse und zum Hindurchstoßen des Vorformlings durch das konische Formwerkzeug (29) axial hin und her bewegbar ist.

Revendications

1. Tampon particulièrement pour l'hygiène féminine, formé à partir d'une pièce approximativement cylindrique qui est formée par enroulement d'une portion de longueur de matériau non tissé en bande, et dont la surface circonférentielle est comprimée radialement par rapport à l'axe médian longitudinal de la pièce, sur un nombre pair d'au moins 6 portions mutuellement adjacentes dans la direction circonférentielle de la pièce d'enroulement, caractérisé en ce que seules des portions étroites en bandes de la surface circonférentielle de la pièce d'enroulement, qui sont disposées à égales distances angulaires les unes par rapport aux autres, sont comprimées pour obtenir une pré-forme qui, telle qu'on peut l'observer en coupe transversale, se compose d'un noyau de fibres central approximativement circulaire (16) de forte résistance à la compression et à la déformation, et de nervures longitudinales (17) de structure de fibre plus douce et avec une structure capillaire plus grossière qui s'étendent radialement à l'extérieur du noyau de fibres et qui sont séparées les unes des autres par des encoches longitudinales ouvertes vers l'extérieur (13), et en ce que, en conséquence, seules les nervures longitudinales douces de la pré-forme (15) ont été soumises à une faible compression uniforme, radialement par rapport à l'axe médian longitudinal, de telle sorte que les extrémités extérieures des nervures longitudinales forment une surface cylindrique douce essentiellement lisse d'un diamètre plus petit, la structure capillairc plus grossière correspondant à la forme finale du tampon maintenu (10).

2. Un tampon selon la Revendication 1, dont la pièce est produite à partir d'une bande non tissée aiguillée composée de 100 % de fibre de cellulose, caractérisé en ce que le tampon, qui pèse 2,4 g sans la bande de recouvrement, présente un pouvoir d'absorption spécifique de 4,8 ml/g à une vitesse d'absorption de 1,9 ml/s.

3. Un tampon selon la Revendication 2, caractérisé en ce que le pouvoir d'absorption du tampon est de 11,3 ml à une contrepression statistique de 20 mbars.

4. Un tampon selon les Revendications 1 à 3, caractérisé en ce qu'à une contrepression pulsatoire de 20 à 110 mbars, le pouvoir d'absorption du tampon est de 8,0 ml et le pouvoir d'absorption spécifique de 3,4 ml/g.

5. Un tampon selon une des Revendications 1 à 4, caractérisé en ce que le diamètre du tampon, dans sa forme finale, se situe entre 13 et 15 mm, le noyau de fibre central présentant un diamètre de 4 à 8 mm.

6. Un procédé pour la production du tampon selon les Revendications 1 à 5, selon lequel une pièce essentiellement cylindrique est formée par enroulement d'une portion de longueur de matériau non tissé en bande, dont la surface circonférentielle est comprimée radialement par rapport à l'axe médian longitudinal de la pièce, sur un nombre pair d'au moins 6 portions mutuellement adjacentes dans la direction circonférentielle de la pièce d'enroulement, caractérisé en ce que seules des portions étroites en bandes de la surface circonférentielle de la pièce d'enroulement, qui sont disposées à égales distances angulaires les unes par rapport aux autres, sont comprimées pour obtenir une pré-forme qui, telle qu'on peut l'observer en coupe transversale, se compose d'un noyau de fibres central approximativement circulaire de forte résistancc à la compression et à la déformation, et de nervures longitudinales de structure de fibre plus douce et avec une structure capillaire plus grossière qui s'étendent radialement à l'extérieur du noyau de fibres et qui sont séparées les unes des autres par des encoches longitudinales ouvertes vers l'extérieur, et en ce que, en conséquence, seules les nervures longitudinales douces de la pré-forme sont soumises à une faible compression uniforme, radialement par rapport à l'axe médian longitudinal, jusqu'à ce que les extrémités extérieures des nervures longitudinales aient formé une surface cylindrique douce essentiellement lisse d'un diamètre plus petit, la structure capillaire plus grossière correspondant à la forme finale du tampon maintenu.

7. Un procédé selon la Revendication 6, caractérisé en ce que la pièce d'enroulement est centrée avant compression.

8. Un procédé selon la Revendication 6, caractérisé en ce que la pré-forme est déplacée pour des raisons de formage.

9. Un dispositif pour la production du tampon selon une des Revendications 1 à 8 et pour réaliser le procédé selon une des Revendications 6 à 8, composé de 2 groupes chacun d'au moins 6 moules de presse dis-

posés sur un plan perpendiculaire à l'axe de la presse, le premier groupe de moules de presse formant des segments de presse, dont les flancs, en position fermée des segments de presse forment respectivement pour chacun des moules de presse des surfaces de guidage du second groupe qui sont conçues comme plaques coulissantes, les faces d'extrémité des moules de presse formant une face de compression essentiellement cylindrique, caractérisé en ce que les segments de presse (22) et les plaques coulissantes (24) forment une presse préformante pour la compression de la pré-forme (15), des couteaux de la presse (27) dépassant à partir des faces d'extrémité (25,26) des segments de presse (22) et des plaques coulissantes (24), et en ce que la presse préformante est suivie d'un moule formant conique fixe (29) qui est disposé coaxialement par rapport à l'axe de la presse , et dont l'orifice d'entrée (30) est calculé pour correspondre au diamètre de l'orifice de la presse préformante, lorsque ses moules de presse (22,24) sont en position fermée, et dont l'orifice de sortie (32) est calculé pour correspondre à la section transversale finale du tampon fini (10).

10. Un dispositif selon la Revendication 9, caractérisé en ce que les couteaux de la presse (27) dépassent des faces d'extrémité (25, 26) des segments de la presse (22) et des plaques coulissantes (24) à des distances angulaires égales (α) et sur la mêmc longueur.

11. Un dispositif selon la Revendication 9 ou 10, caractérisé en ce que tous les couteaux de la presse (27) ont les mêmes faces de compression (28).

12. Un dispositif selon la Revendication 11, caractérisé en ce que la face de compression (28) des couteaux de la presse (27) qui est parallèle à l'axe de la presse (21) est cintrée vers l'extérieur.

13. Un dispositif selon la Revendication 9 ou 10, caractérisé en ce que les couteaux de la presse (27) présentent des faces de compression (28) de différentes formes.

14. Un dispositif selon une des Revendications 9 à 13, caractérisé en ce que la longueur et la largeur des couteaux de la presse (27), disposés radialement par rapport à l'axe de la presse (21), s'élèvent respectivement à 10 et 2 mm.

15. Un dispositif selon une des Revendications 9 à 14, caractérisé en ce que, lorsque la presse se trouve en position fermée, les faces de compression (28) des couteaux de la presse (26) se tenant à une distance définie de 2 ou 4 mm de l'axe de la presse (21).

16. Un dispositif selon la Revendication 9, caractérisé en ce que le moule formant conique (29) possède un orifice d'entrée (30) ayant un diamètre de 20 mm et un orifice de sortie (32) ayant un diamètre de 13 mm.

17. Un dispositif selon une des Revendications 9 à 16, caractérisé en ce que tous les moules de presse (22, 24) peuvent d'abord être fermés de façon concentrique par rapport à l'axe de la presse (21) au diamètre approximatif de la pièce d'enroulement (11), ensuite les segments de la presse (22) du premier groupe peuvent se déplacer simultanément de façon concentrique pour atteindre la position fermée, suite à quoi les plaques coulissantes (24) du second groupe peuvent se déplacer pour atteindre la dimension finale de la pré-forme (15).

18. Un dispositif selon une des Revendications 9 à 16, caractérisé en ce que les segments de presse (22) et les plaques coulissantes (24) peuvent se déplacer simultanément de façon concentrique par rapport à l'axe de la presse (21) dans la position fermée qui correspond à la dimension finale de la pré-forme (15).

19. Un dispositif selon une des Revendications 9 à 16, caractérisé en ce que il se trouve un vérin, disposé sur la face d'entrée de la presse préformante, qui se déplace axialement selon un mouvement de va et vient, éjectant la pré-forme (15) de la presse préformantc et pour pousser la pré-forme à travers le moule formant conique (29).

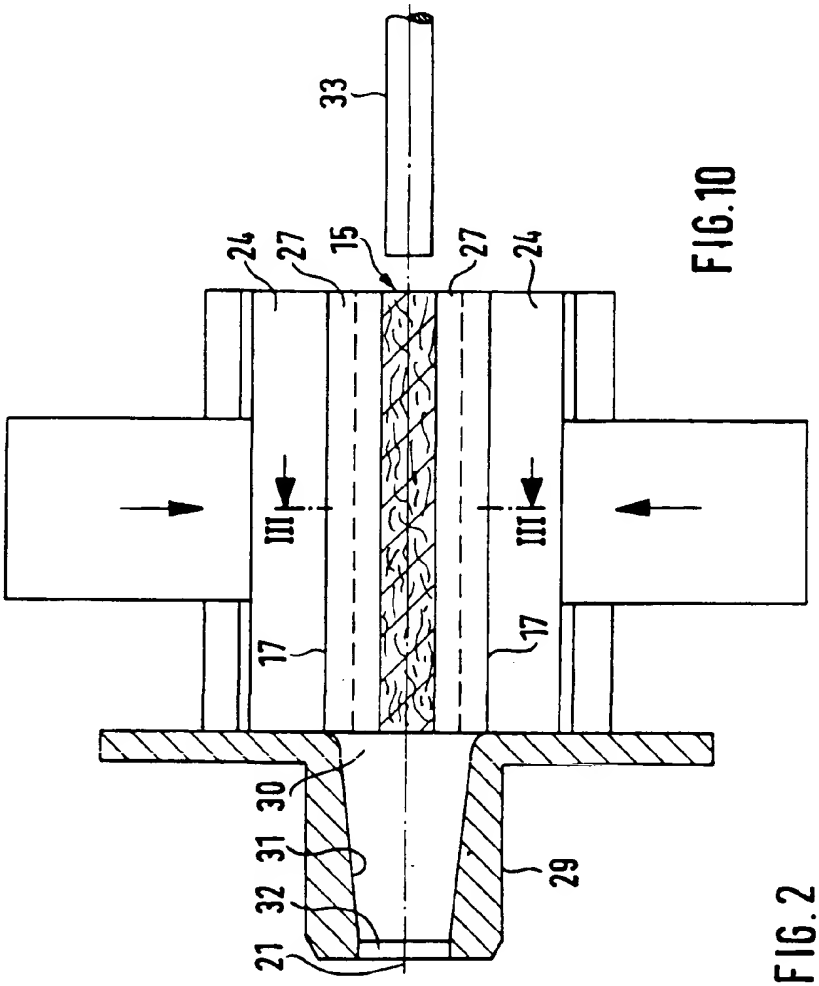

FIG.10

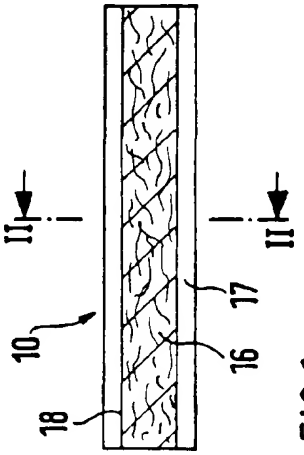

FIG.1

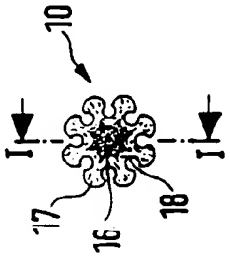

FIG.2

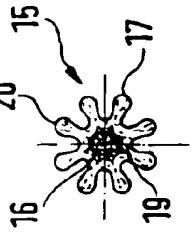

FIG.3

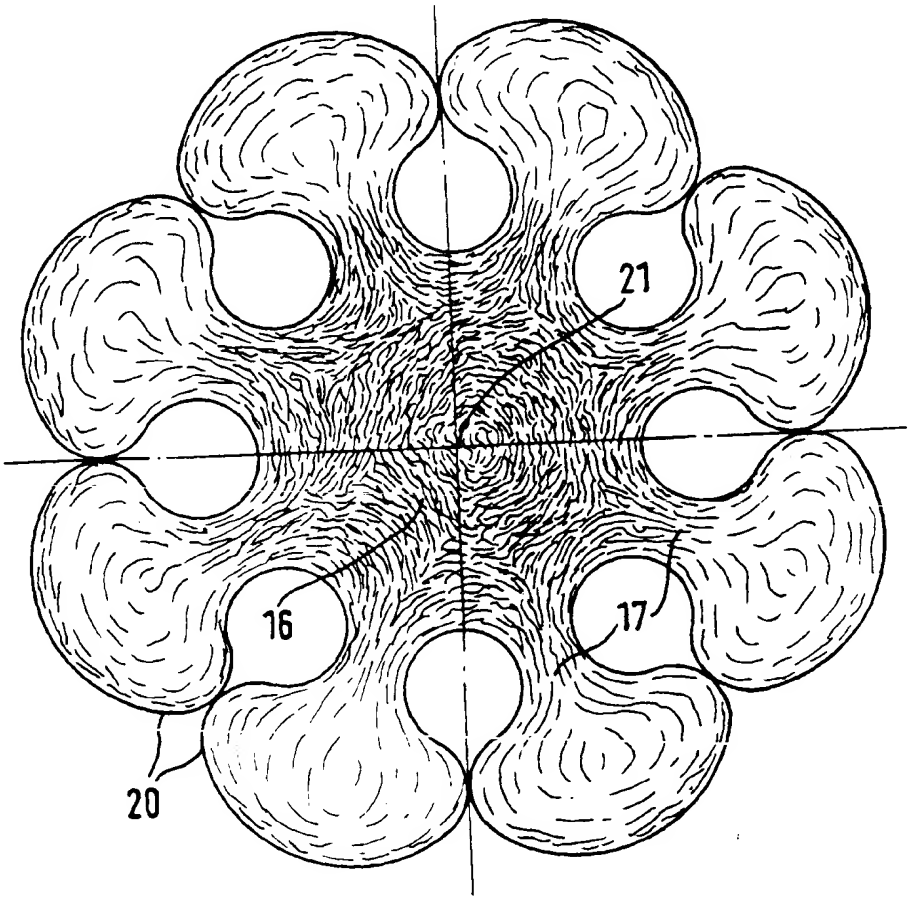

FIG. 4

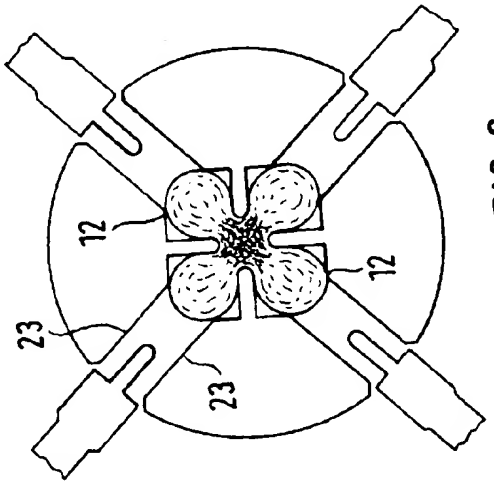

FIG.6

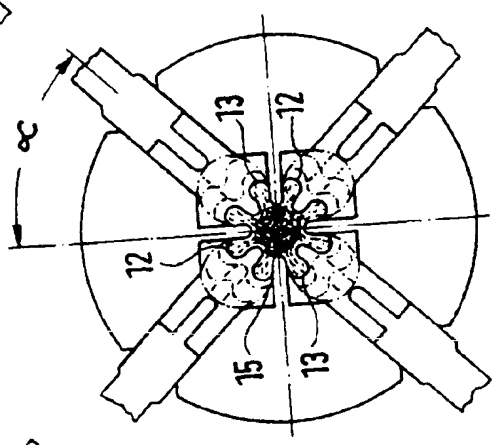

FIG.7

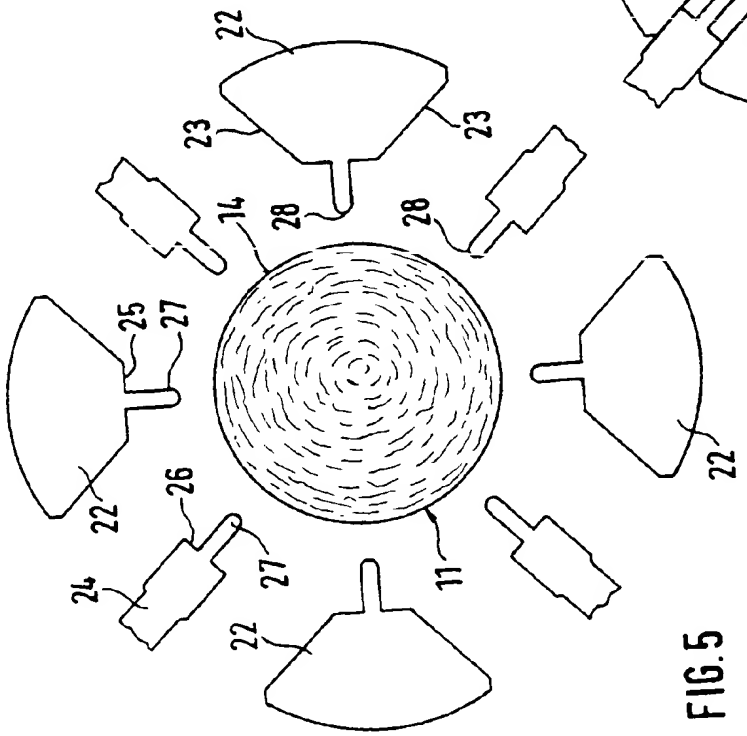

FIG.5

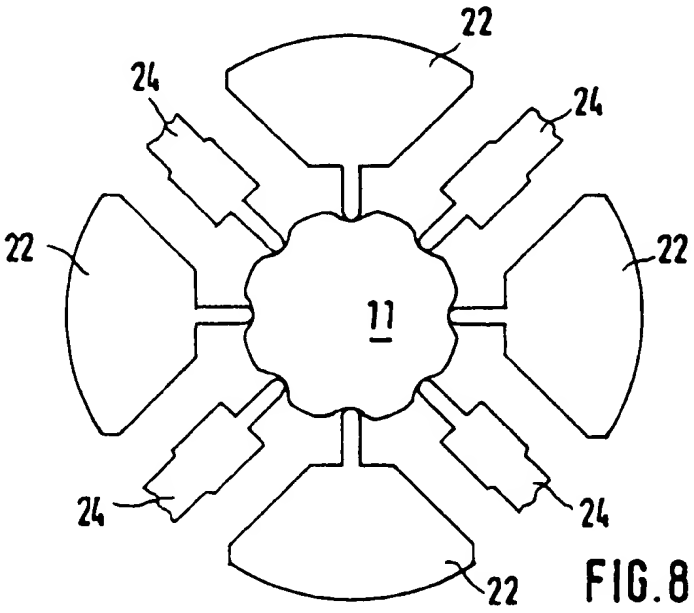

FIG.8

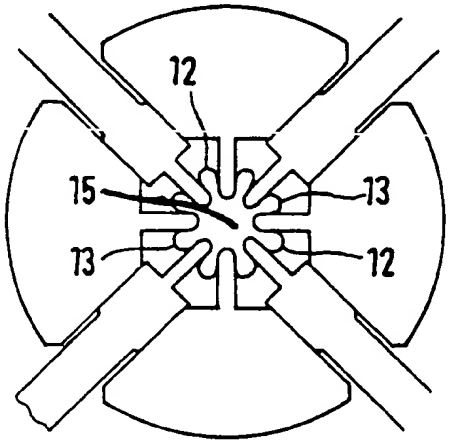

FIG.9